



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/673,864	09/29/2003	David Haase	EMC-03-102	1363

24227 7590 10/20/2005
EMC CORPORATION
OFFICE OF THE GENERAL COUNSEL
176 SOUTH STREET
HOPKINTON, MA 01748

EXAMINER

FARROKH, HASHEM

ART UNIT PAPER NUMBER

2187

DATE MAILED: 10/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/673,864

Applicant(s)

HAASE ET AL.

Examiner

Hashem Farrokh

Art Unit

2187

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 September 2003.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-21 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 9/29/03 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

The instant application having application No. 10/673,864 has a total of 21 claims pending in the application; there are 3 independent claims and 18 dependent claims, all of which are ready for examination by the examiner.

INFORMATION CONCERNING SPECIFICATION:

The disclosure is objected to because of the following informalities:

1. Specification (page 2, lines 16-17 and 19-20) state: "Serial No. To Be Determined". The specification must be amended to include the appropriate serial numbers.

Appropriate correction is required.

INFORMATION CONCERNING CLAIMS:

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

2. *In regard to claims 1, 4, 8, 11, 15 and 18 the expression "...extents of the clone that may be different from the clone and the source" is unclear. The specification does not explain this limitation. In addition the expression "may be" is an indefinite term.*

A clarification/correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,898,681 B2 to Young in view of U.S. Patent No. 6,522,037 to Kitagawa et al. (hereinafter Kitagawa).

In regard to claims 1, 4, 8, 11, 15 and 18 the Examiner was not able to understand what the Applicant means by the expression: "...extents of the clone that may be different from the clone and the source". The Examiner search the specification to find support for this limitation, but was unable to find explanation of this limitation. In the following rejection of these claims, the examiner assumes "...extents of the clone that may be different between the clone and the source" (emphasis added).

3. *In regard to claim 1, Young teaches:*

"In a data storage environment having a first volume of data denominated as the source being stored on a data storage system (**column 4, lines 11-15; element 6 in Fig. 1**), and a second volume of data denominated as the clone and which has data content that is a copy of the data content of the source being stored on the data storage system or on another data storage system (**column 4, lines 11-15; element 8 in Fig. 1**), a method of recovering the clone's data content during a restoration of the source," (**e.g., see column 1, lines 61-64; column 7, lines 30-38; element 4 in Fig. 1**). For example

the master store or volume represents the first volume and shadow store or volume represents the clone volume recited in the claim. The shadow store contains the point in time copy of master data, which is used for recovery, of the master or source from the shadow or clone.

“the method comprising the steps of:”

“preserving the data content of clone by not allowing it to be overwritten during the restoring of the source,” (e.g., see column 1, lines 61-64; column 20, lines 4-7). For example the controller is arranged to allow the user to preserve the data content of shadow store (e.g., not to overwrite the point time copy).

“which restoration operation occurs when the data content of the source by is replaced with the data content clone;” (e.g., see column 11, lines 55-62).

“creating a persistent map denominated as a protected restore map to track extents of the source that are modified during the restoring and preserving steps.” (e.g., see column 8, lines 22-40; Figs. 1 and 6a). For example the shadow bitmap is created in the bitmap store (element 10 in Fig. 1) which is a persistent map within the Mass Storage Device. When a block in the master store is overwritten (e.g., modified or updated), a corresponding bit in the shadow bit map is set to logic 1.

“creating a persistent map denominated as a persistent clone delta map to track extents of the clone that may be different from the clone and the source;” (e.g., see column 8, lines 22-40; Figs. 5c and 6a). For example the copy bit map, a persistent map within the Mass Storage Device 10, represent clone delta map recited in the claim is used to track the data blocks which are different between the master and shadow stores. A logic

1 in the copy bit map indicates that the corresponding data in the master store is different from the shadow store. When data copied from the master to the shadow store the corresponding bit in the copy bit map is being set to a logic 0 indicating that both master store and shadow store contain identical data.

“using the persistent protected restore map and the persistent clone delta map to resume the restore operation...” (e.g., see column 8, lines 22-40; Fig. 6c). For example user instructs recovery of master store from shadow store. The controller using the shadow bitmap and copy bitmap coordinates the restoration of the master store. Although Young teaches that backup and recovery of data in the event of system failure (e.g., see column 1, lines 33-36). Young does not expressly teach: “a method of recovering the clone data in a situation wherein an operation to restore the source is interrupted during the restoration of data”

Kitagawa teaches: “a method of recovering the clone data in a situation wherein an operation to restore the source is interrupted during the restoration of data” (e.g., see column 2, lines 38-39) for using a backup system which reduces time in the event of interruption during data recovery.

Disclosures by Young and Kitagawa are analogous because both references teach methods of managing data backup and restoration or recovery.

At the time of invention it would have been obvious to a person of ordinary skill in art to modify the storage system taught Young to include the optimum backup and recovery method (including interruption during data restoration) taught by Kitagawa.

The motivation for combination (as taught by column 3, lines 10-15) would have been to obtain optimum backup data in which a whole backup and differential backups are combined and for enabling a recovery process after backup and was obtained to be efficiently executed in a short time.

Therefore, it would have been obvious to combine disclosures by Kitagawa and Young to obtain the invention as specified in the claim.

4. *In regard to claims 2, 9, and 16 Young teaches:*

“wherein the source and the clone are each represented by respective first and second logical units.” (column 2, lines 35-40; column 4, lines 11-15). For example Young teaches that that a plurality of volumes are grouped together as a single logical device (e.g., source logical unit). The point in time copy of logical device is stored in shadow storage, which is in separate volumes, or logical device, which represents the clone logical unit recited in the claim.

5. *In regard to claims 3, 5, 10, 12, 17, and 19 Young teaches: “wherein a map denominated as a protected restore map is used to track extents of the source that are modified during the restoring and preserving steps.” (e.g., see column 8, lines 22-40; Fig. 6a). For example when a block in the master store is overwritten (e.g., modified), a corresponding bit in the shadow bit map is set to logic 1.*

6. *In regard to claims 4, 11 and 18 Young teaches:*

“wherein a map denominated as a clone delta map is used to track extents of the clone that may be different from the clone and the source.” (e.g., see column 8, lines 22-40; Fig. 6a). For example copy bit map which represent clone delta map recited in the claim

is used to track the data blocks which are different between the master and shadow stores. A logic 1 in the copy bit map indicates that the corresponding data in the master store is different from the shadow store. When data copied from the master to the shadow store the corresponding bit in the copy bit map is being set to a logic 0 indicating that both master store and shadow store contain identical data.

7. *In regard to claims 6, 13 and 20 Young teaches:*

"wherein the clone delta map is used to copy only extents that are different between the clone and its source during the restoration step." (e.g., see column 10, lines 50-53; column 14, lines 26-31; Fig. 5a). For example setting of a bit in the bit map (e.g., a "logic 1") indicates that its corresponding data block in the shadow store is different from the one in the master store. The data blocks that have their corresponding bits in the bit map set will be copied to the master store during the restoration or recovery.

8. *In regard to claims 7, 14 and 21 Young teaches:*

"wherein the protected restore map is coordinated with the clone delta map for efficient processing of write data to the source." (e.g., see column 6, lines 66-67; column 7, lines 1-43; Fig. 5a-5e). For example the shadow bit map coordinated with the copy bit map for efficient of processing of write data to the master store.

9. *In regard to claim 8, Young teaches:*

A system (column 22, lines 24-26) for recovering the restoring data from a second volume of data to a first volume of data," (e.g., see column 1, lines 61-64; column 7, lines 30-38; element 4 in Fig. 1).

"the system comprising:"

“a data storage system having a first volume of data denominated as the source being stored on a data storage system (**column 4, lines 11-15; element 6 in Fig. 1**), and a second volume of data denominated as the clone and which has data content that is a copy of the data content of the source being stored on the data storage system or on another data storage system;” (**e.g., see column 4, lines 11-15; element 8 in Fig. 1**).

“computer-executable program logic configured for causing the following computer-executed steps to occur;” (**e.g., see column 25, lines 1-31; column 27, lines 38-46**).

“preserving the data content of clone by not allowing it to be overwritten during the restoring of the source,” (**e.g., see column 1, lines 61-64; column 20, lines 4-7**). *For example the controller is arranged to allow the user to preserve the data content of shadow store (e.g., not to overwrite the point time copy).*

“which restoration operation occurs when the data content of the source by is replaced with the data content clone;” (**e.g., see column 11, lines 55-62**).

“creating a persistent map denominated as a protected restore map to track extents of the source that are modified during the restoring and preserving steps.” (**e.g., see column 8, lines 22-40; Figs. 1 and 6a**). *For example the shadow bitmap is created in the bitmap store (element 10 in Fig. 1) which is a persistent map within the Mass Storage Device. When a block in the master store is overwritten (e.g., modified or updated), a corresponding bit in the shadow bit map is set to logic 1.*

“creating a persistent map denominated as a persistent clone delta map to track extents of the clone that may be different from the clone and the source;” (**e.g., see column 8, lines 22-40; Figs. 5c and 6a**). *For example the copy bit map, a persistent map within*

the Mass Storage Device 10, represent clone delta map recited in the claim is used to track the data blocks which are different between the master and shadow stores. A logic 1 in the copy bit map indicates that the corresponding data in the master store is different from the shadow store. When data copied from the master to the shadow store the corresponding bit in the copy bit map is being set to a logic 0 indicating that both master store and shadow store contain identical data.

“using the persistent protected restore map and the persistent clone delta map to resume the restore operation...” (e.g., see column 8, lines 22-40; Fig. 6c). For example user instructs recovery of master store from shadow store. The controller using the shadow bitmap and copy bitmap coordinates the restoration of the master store. Although Young teaches that backup and recovery of data in the event of system failure (e.g., see column 1, lines 33-36). Young does not expressly teach: “a method of recovering the clone data in a situation wherein an operation to restore the source is interrupted during the restoration of data”

Kitagawa teaches: “a method of recovering the clone data in a situation wherein an operation to restore the source is interrupted during the restoration of data” (e.g., see column 2, lines 38-39) for using a backup system which reduces time in the event of interruption during data recovery.

10. *In regard to claim 15, Young teaches:*

A program product (e.g., column 4, lines 17-19) for use in a data storage environment and being for protecting data content during restoration of data from a second volume of

data to a first volume of data," (e.g., see column 1, lines 61-64; column 7, lines 30-38; element 4 in Fig. 1).

"wherein the data storage environment includes:"

"a data storage system having a first volume of data denominated as the source being stored on a data storage system (column 4, lines 11-15; element 6 in Fig. 1), and a second volume of data denominated as the clone and which has data content that is a copy of the data content of the source being stored on the data storage system or on another data storage system;" (e.g., see column 4, lines 11-15; element 8 in Fig. 1).

"the program product includes computer-executable logic contained on a computer-readable medium and which is configured for causing the following computer-executed steps to occur:" (e.g., see column 25, lines 1-31; column 27, lines 38-46).

"preserving the data content of clone by not allowing it to be overwritten during the restoring of the source," (e.g., see column 1, lines 61-64; column 20, lines 4-7). *For example the controller is arranged to allow the user to preserve the data content of shadow store (e.g., not to overwrite the point time copy).*

"which restoration operation occurs when the data content of the source by is replaced with the data content clone;" (e.g., see column 11, lines 55-62).

"creating a persistent map denominated as a protected restore map to track extents of the source that are modified during the restoring and preserving steps." (e.g., see column 8, lines 22-40; Figs. 1 and 6a). *For example the shadow bitmap is created in the bitmap store (element 10 in Fig. 1) which is a persistent map within the Mass*

Storage Device. When a block in the master store is overwritten (e.g., modified or updated), a corresponding bit in the shadow bit map is set to logic 1.

“creating a persistent map denominated as a persistent clone delta map to track extents of the clone that may be different from the clone and the source,” (e.g., see column 8, lines 22-40; Figs. 5c and 6a). For example the copy bit map, a persistent map within the Mass Storage Device 10, represent clone delta map recited in the claim is used to track the data blocks which are different between the master and shadow stores. A logic 1 in the copy bit map indicates that the corresponding data in the master store is different from the shadow store. When data copied from the master to the shadow store the corresponding bit in the copy bit map is being set to a logic 0 indicating that both master store and shadow store contain identical data.

“using the persistent protected restore map and the persistent clone delta map to resume the restore operation...” (e.g., see column 8, lines 22-40; Fig. 6c). For example user instructs recovery of master store from shadow store. The controller using the shadow bitmap and copy bitmap coordinates the restoration of the master store. Although Young teaches that backup and recovery of data in the event of system failure (e.g., see column 1, lines 33-36). Young does not expressly teach: “a method of recovering the clone data in a situation wherein an operation to restore the source is interrupted during the restoration of data”

Kitagawa teaches: "a method of recovering the clone data in a situation wherein an operation to restore the source is interrupted during the restoration of data" (e.g., see column 2, lines 38-39) for using a backup system which reduces time in the event of interruption during data recovery.

Conclusion

The prior art made of record and not relied upon are as follows:

- 1. U. S. Patent No. 5,742,792 to Yanai et al. describes Remote data mirroring.*
- 2. U. S. Patent No. 6,910,111 B1 to Colgrove et al. describes Volume restoration using an accumulator map.*
- 3. U. S. Patent No. 6,532,551 B1 to Kamei et al. describes Data management method for backup memory.*

Any inquiry concerning this communication should be directed to Hashem Farrokh whose telephone number is (571) 272-4193. The examiner can normally be reached Monday-Friday from 8:00 AM to 5:00 PM.

If attempt to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Donald A Sparks, can be reached on (571) 272-4201.


Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published application may be obtained from either private PAIR or Public PAIR. Status information for unpublished application is available through Private PAIR only. For more information about PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on

Art Unit: 2187

*access to the Private PAIR system, contact the Electronic Business Center (EBS) at
866-217-9197 (toll-free).*

HF
HF

2005-10-16



DONALD SPARKS
SUPERVISORY PATENT EXAMINER